

Serial No: 09/474,031

Attorney Docket No: 113435

CLAIMS

1 1. (Currently amended) A method that restores communication in a
2 mesh network between a first end node and a second end node, comprising:
3 transmitting a communication signal over a first communication path
4 comprising the first end node, the second end node and one or more first
5 intermediate nodes;
6 detecting an error condition at at least one of the first end node and the
7 second end node, said error condition being not adjacent to said at least one end
8 node; and
9 said at least one end node initiating rerouting the communication signal over
10 a second communication path based on the detected error condition in order to
11 restore communication, the second path having been ~~determined~~-chosen, before the
12 error condition ~~is~~-was detected, to carry the rerouted communication signal and the
13 second path including the first end node, the second end node, and one or more
14 second intermediate nodes, wherein the second intermediate nodes are disjoint from
15 the one or more first intermediate nodes;
16 the second path further including one or more transmission lines each
17 having a plurality of channels, at least one said channel being assigned, after the
18 error condition is detected, to carry the communication signal.

2. Canceled.

1 3. (Previously presented) The method of claim 1, further comprising
2 sending one or more back-off commands to release at least one channel that had been
3 assigned, after the error condition had been detected, to carry the communication
4 signal.

Serial No: 09/474,031

Attorney Docket No: 113435

1 4. (Previously presented) The method of claim 1, wherein the first and
2 second end nodes coordinate rerouting the communication signal over the second
3 path.

1 5. (Original) The method of claim 1, wherein the mesh network is an
2 optical mesh network.

6. Canceled.

1 7. (Previously presented) The method of claim 1, wherein the step of
2 rerouting the communication signal includes
3 issuing commands, after the error condition is detected, in a direction from
4 the first end node to at least one of the second intermediate nodes to bi-directionally
5 assign channels in at least one of said transmission lines, and
6 issuing commands, after the error condition is detected, in a direction from
7 the second end node to at least one of the second intermediate nodes to bi-
8 directionally assign channels in at least one of said transmission lines.

1 8. (Previously presented) The method of claim 1, wherein the step of
2 rerouting the communication signal includes:
3 responding to a failure indication sent from the first end node to the second
4 end node by issuing commands from the second end node to the one or more second
5 intermediate nodes to bi-directionally assign channels along the second path.

1 9. (Previously presented) The method of claim 1, wherein the step of
2 rerouting the communication signal includes issuing commands from the first end
3 node to the one or more second intermediate nodes to unidirectionally assign
4 channels along the second path in a first direction.

Serial No: 09/474,031

Attorney Docket No: 113435

1 10. (Previously presented) The method of claim 9, wherein the step of
2 rerouting the communication signal further includes issuing commands from the
3 second end node to the one or more second intermediate nodes to unidirectionally
4 assign channels along the second path in a second direction.

1 11. (Original) The method of claim 1, wherein the mesh network is a
2 synchronous optical network (SONET) defined by the ANSI T1.105.

1 12. (Previously presented) The method of claim 1, wherein channels are
2 assigned to carry the communication signal over the second path using a contention
3 technique.

1 13. (Currently amended) A mesh network having a first end node and a
2 second end node, comprising:
3 a first communication path that transmits a communication signal, the first
4 communication path including the first end node, the second end node and one or
5 more first intermediate nodes;
6 an error detecting device in at least one of the first end node and the second
7 end node for detecting the occurrence of an error in any portion of said first
8 communication path; and
9 a predetermined second communication path that is ~~determined~~ chosen,
10 before the error detecting device detects an error condition, ~~and that transmits to~~
11 transmit the communication signal after in the event that the error detecting device
12 detects ~~the an~~ error condition, the predetermined second path comprising the first end
13 node, the second end node, and one or more second intermediate nodes, wherein the
14 second intermediate nodes are disjoint from the one or more first intermediate nodes;
15 the second path further including one or more transmission lines each having
16 a plurality of channels, and at least one said channel being assigned, after the error
17 condition is detected, to carry the communication signal.

Serial No: 09/474,031

Attorney Docket No: 113435

14. Canceled.

1 15. (Previously presented) The mesh network of claim 13, wherein the
2 communication signal is rerouted from the first path to the second path based on an
3 error condition detected by the error detecting device.

1 16. (Previously presented) The mesh network of claim 13, wherein the
2 communication signal is rerouted from the first path to the second path based on a
3 communication of the second end node.

1 17. (Previously presented) The mesh network of claim 13, wherein the
2 first end node responds to an error condition by issuing commands to the one or
3 more second intermediate nodes to unidirectionally assign channels along the second
4 path in a first direction.

1 18. (Previously presented) The mesh network of claim 17, wherein the
2 second end node responds to the error condition by issuing commands to the one or
3 more second intermediate nodes to unidirectionally assign channels along the second
4 path in a second direction.

1 19. (Currently amended) The mesh network of claim 13, wherein the
2 mesh network ~~uses~~is a synchronous optical network (SONET) defined by the ANSI
3 T1.105.

1 20. (Previously presented) The mesh network of claim 13, wherein one or
2 more channels of at least one of said transmission lines are assigned to carry the
3 communication signal using a contention technique.

Serial No: 09/474,031
113435

Attorney Docket No:

1 21. (Currently amended) A method for rerouting communications
2 between first and second nodes of a mesh network upon a failure in a first path
3 between the first and second nodes, the method comprising rerouting the
4 communications over a second path identified that was chosen, prior to said a failure,
5 to carry the communications in the event of a failure, the second path being node and
6 span disjoint from the first path and the communications in the second path being
7 carried over at least one assigned channel in at least one transmission line between at
8 least one pair of nodes of the second path, said rerouting including assigning said at
9 least one channel after said failure occurred.

1 22. (Previously presented) The method of claim 21 wherein said
2 assigning further includes
3 assigning bi-directional channels in transmission lines of the second path in a
4 direction from the first node toward the second node and concurrently assigning bi-
5 directional channels in transmission lines of the second path in a direction from the
6 second node toward the first node.

1 23. (Previously presented) The method of claim 21 wherein the mesh
2 network is an optical network.

1 24. (Previously presented) The method of claim 21 wherein the mesh
2 network is a synchronous optical network (SONET) defined by ANSI T1.105.

1 25. (Currently amended) A method for use in a mesh network comprising
2 nodes interconnected by links, the method comprising:
3 establishing a first communication path from a first node to a second node,
4 the first communication path including at least two of said links and at least one
5 intermediate node;

Serial No: 09/474,031
113435

Attorney Docket No:

6 directing communications traffic from the first end node to the second end
7 node over the first path; and
8 responsive to a failure in the first path, rerouting the traffic to a second
9 communication path that had been identified prior to said failure as being the path
10 over which the traffic would be rerouted in the event of a failure in the first path, the
11 second path including at least two of said links and at least one intermediate node,
12 the second path being node and span disjoint from the first path, and the traffic over
13 the second path being directed over at least one assigned channel within a
14 multichannel link of the second path that was assigned subsequent to said failure.

1 26. (Previously presented) The method of claim 25 wherein said
2 rerouting includes
3 assigning bi-directional channels in links of the second path in a direction
4 from the first node toward the second node and concurrently assigning bi-directional
5 channels in transmission lines of the second path in a direction from the second node
6 toward the first node.

1 27. (Previously presented) The method of claim 25 wherein the mesh
2 network is a synchronous optical network (SONET) defined by ANSI T1.105.

1 28. (Currently Amended) A method for use in a mesh network
2 comprising nodes interconnected by transmission lines, at least two of the
3 transmission lines being capable of carrying communication traffic in a plurality of
4 channels, the method comprising:
5 establishing a first communication path between a first node and a second
6 node, the first communication path including at least two of the transmission lines
7 and at least one intermediate node;
8 directing communications traffic from the first end node to the second end
9 node over assigned channels of the transmission lines in the first path; and

Serial No: 09/474,031
113435

Attorney Docket No:

10 responsive to a failure in the first path, rerouting the traffic over assigned
11 channels in the transmission lines of a second communication path between the first
12 node and the second node, the second communication path having been identified
13 chosen prior to said failure as being the path over which said communications traffic
14 would be directed in the event of a failure in the first path, the second path having at
15 least one intermediate node, the second path having no intermediate nodes or
16 transmission lines in common with the first path, and at least one of the channels in
17 the transmission lines of the second path being assigned subsequent to said failure.

1 29. (Previously presented) The method of claim 28 wherein said
2 rerouting includes
3 assigning bi-directional channels in transmission lines of the second path in a
4 direction from the first node toward the second node and concurrently assigning bi-
5 directional channels in transmission lines of the second path in a direction from the
6 second node toward the first node.

1 30. (Previously presented) The method of claim 28 wherein the mesh
2 network is a synchronous optical network (SONET) defined by ANSI T1.105.

1 31. (Currently amended) A node for use as a first node in a mesh
2 network of a type in which communications signals between said first node and a
3 second node of said network over a first path through said network are rerouted over
4 a second path through said network upon a failure in said first path, said second path
5 having been identified prior to said failure as being the path over which said
6 communications signals would be rerouted in the event of a failure in said first path,
7 the second path being node and span disjoint from the first path, said first node being
8 arranged to initiate, after said failure in said first path, an assignment of channels,
9 within links connecting pairs of nodes in the second path, to carry said
10 communications signals.

Serial No: 09/474,031
113435

Attorney Docket No:

1 32. (Previously presented) The invention of claim 31 wherein an
2 identification of said second path is stored in said first node.

1 33. (Previously presented) The node of claim 32 wherein said assignment
2 includes
3 assigning bi-directional channels in links of the second path in a direction
4 from said first node toward the second node irrespective of whether said second node
5 has initiated concurrent assignment of bi-directional channels in links of the second
6 path in a direction from the second node toward said first node.

1 34. (Currently amended) A method for use by a first node in a mesh
2 network of a type in which communications signals between said first node and a
3 second node of said network over a first path through said network are rerouted over
4 a second path through said network upon a failure in said first path, said second path
5 having been identified prior to said failure as being the path over which said
6 communications signals would be rerouted in the event of a failure in said first path,
7 the second path being node and span disjoint from the first path, said method
8 comprising initiating, after said failure in said first path, the assignment of channels,
9 within links connecting pairs of nodes in the second path, to carry said
10 communications signals.

1 35. (Previously presented) The invention of claim 34 wherein an
2 identification of said second path is stored in said first node.

1 36. (Previously presented) The node of claim 35 wherein said assignment
2 includes
3 assigning bi-directional channels in links of the second path in a direction
4 from said first node toward the second node irrespective of whether said second node

Serial No: 09/474,031
113435

Attorney Docket No:

5 has initiated concurrent assignment of bi-directional channels in links of the second
6 path in a direction from the second node toward said first node.

1 37. (Currently Amended) A computer-readable medium on which are
2 stored instructions that, when executed by one or more nodes in a mesh network,
3 carry out a method for rerouting communications between first and second nodes of
4 the network upon a failure in a first path between the first and second nodes, the
5 method comprising rerouting the communications over a second path identified prior
6 to said failure as being the path over which said communications would be rerouted
7 in the event of a failure in the first path, the second path being node and span disjoint
8 from the first path and the communications in the second path being carried over at
9 least one assigned channel in at least one transmission line between at least one pair
10 of nodes of the second path, said rerouting including assigning said at least one
11 channel after said failure occurred.

1 38. (Previously presented) The computer-readable medium of claim 37
2 wherein said method carries out said rerouting by assigning bi-directional channels
3 in transmission lines of the second path in a direction from the first node toward the
4 second node and concurrently assigning bi-directional channels in transmission lines
5 of the second path in a direction from the second node toward the first node.

1 39. (New) The method of claim 21 wherein said first and second nodes
2 are the end nodes of said first and second paths, wherein at least one of said first and
3 second end nodes is adapted to determine when failures occur in portions of said first
4 path that are adjacent to said at least one end node and in portions of said first path
5 that are not adjacent to said at least one end node, and wherein said rerouting is
6 initiated by said at least one end node.

Serial No: 09/474,031
113435

Attorney Docket No:

1 40. (New) The method of claim 25 wherein said first and second nodes
2 are the end nodes of said first and second paths, wherein at least one of said first and
3 second end nodes is adapted to determine when failures occur in portions of said first
4 communication path that are adjacent to said at least one end node and in portions of
5 said first communication path that are not adjacent to said at least one end node, and
6 wherein said rerouting is initiated by said at least one end node.

1 41. (New) The method of claim 28 wherein said first and second nodes
2 are the end nodes of said first and second communication paths, wherein at least one
3 of said first and second end nodes is adapted to determine when failures occur in
4 portions of said first communication path that are adjacent to said at least one end
5 node and in portions of said first communication path that are not adjacent to said at
6 least one end node, and wherein said rerouting is initiated by said at least one end
7 node.

1 42. (New) The method of claim 31 wherein said first and second nodes
2 are the end nodes of said first and second paths, and wherein said first node is
3 adapted to determine when failures occur in portions of said first path that are
4 adjacent to said at least one end node and in portions of said first path that are not
5 adjacent to said first node.

1 43. (New) The method of claim 34 wherein said first and second nodes
2 are the end nodes of said first and second paths, and wherein said first node is
3 adapted to determine when failures occur in portions of said first path that are
4 adjacent to said at least one end node and in portions of said first path that are not
5 adjacent to said first node.

1 44. (New) The method of claim 37 wherein said first and second nodes
2 are the end nodes of said first and second paths, wherein at least one of said first and

Serial No: 09/474,031

Attorney Docket No: 113435

- 1 second end nodes is adapted to determine when failures occur in portions of said first
- 2 path that are adjacent to said at least one end node and in portions of said first
- 3 communication path that are not adjacent to said at least one end node, and wherein
- 4 said rerouting is initiated by said at least one end node.